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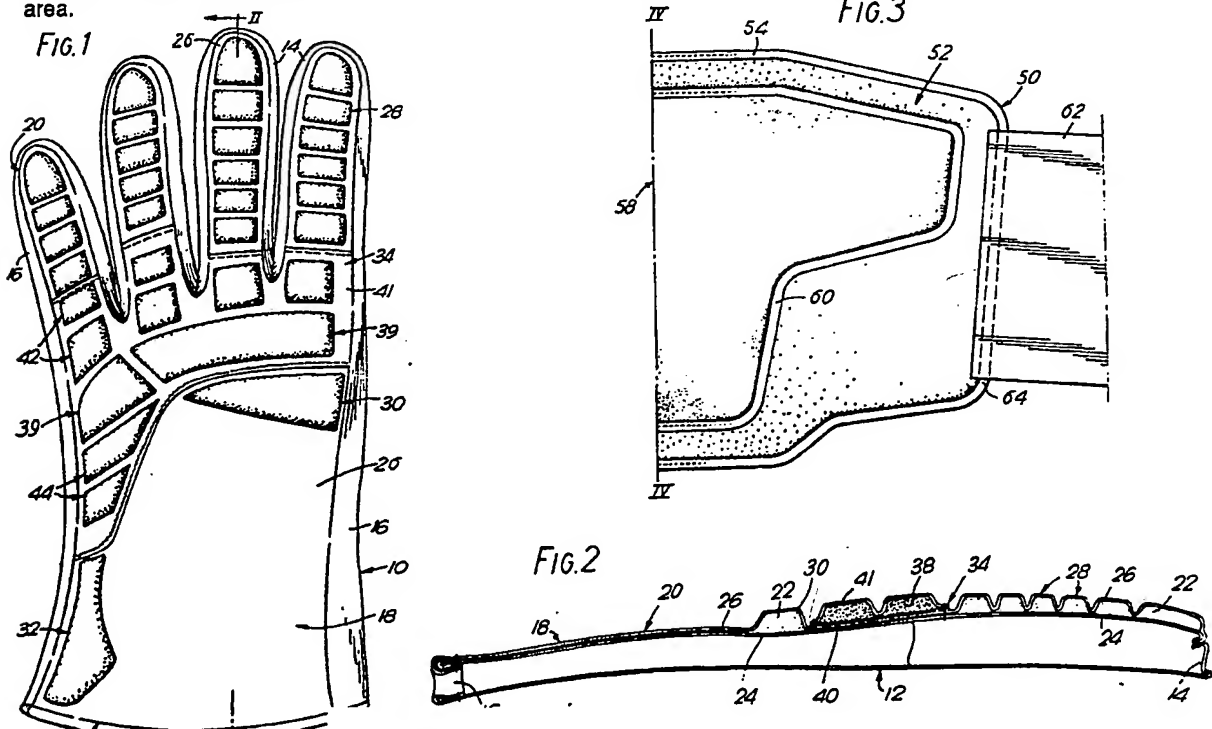
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(54) Protective garments

(57) A protective glove 10 for use in motocross has distal digital pads 28, metacarpal pad 30 and wrist pad 32 formed of a softer foam than knuckle pads 39, proximal digital pads 42 and outer pads 44. The pads are separated by strips of compressed foam which act as hinges.

The use of a harder foam in the more vulnerable areas affords greater protection against impact while maintaining good flexibility.

Also disclosed is a kidney belt (Fig 3) of analogous construction having a generally rectangular panel 22 of softer foam attached at each lateral edge to an elasticated belt, and a T-shaped panel 38 of harder foam superimposed over its central area.



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FIG. 1

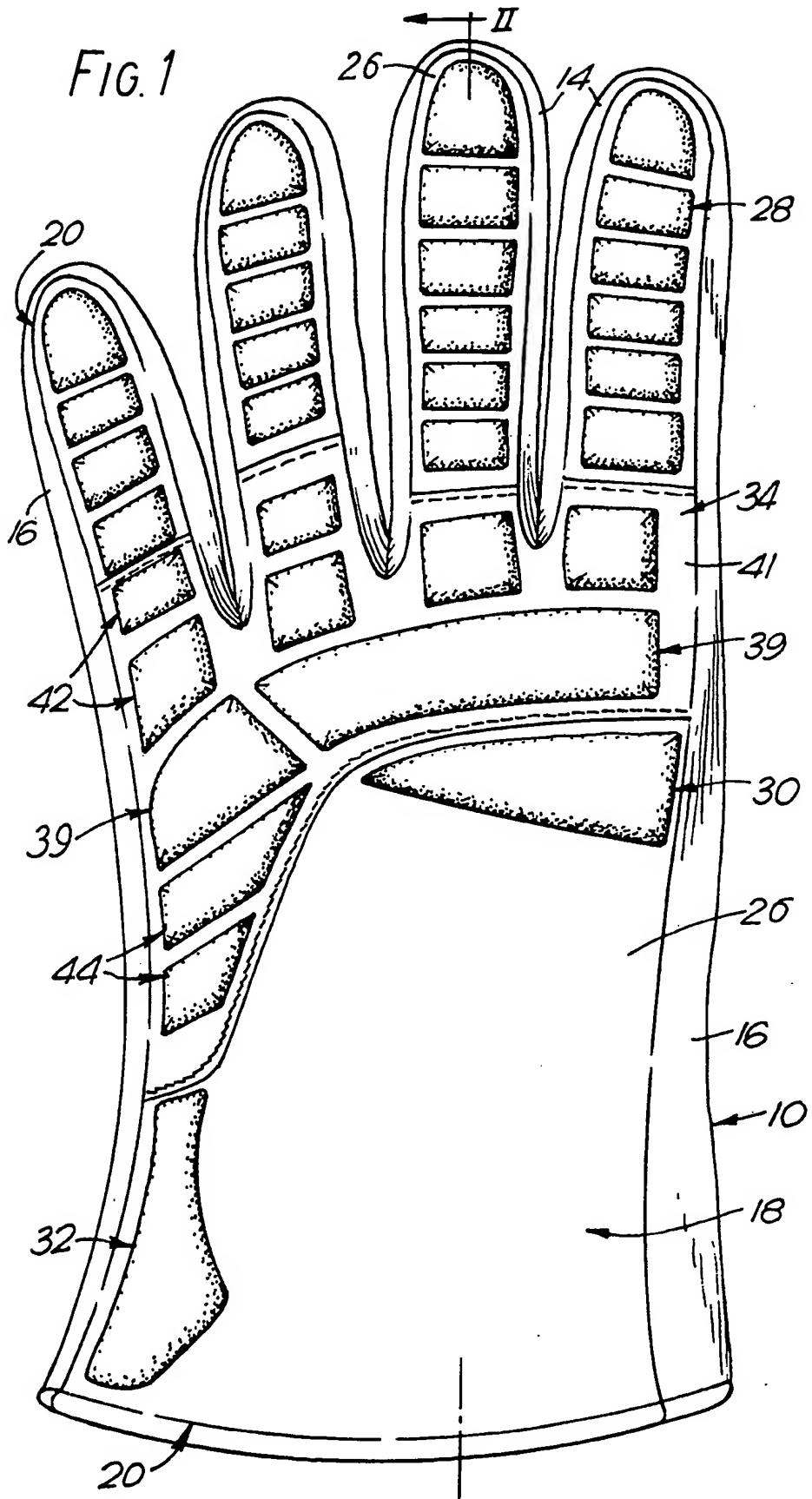
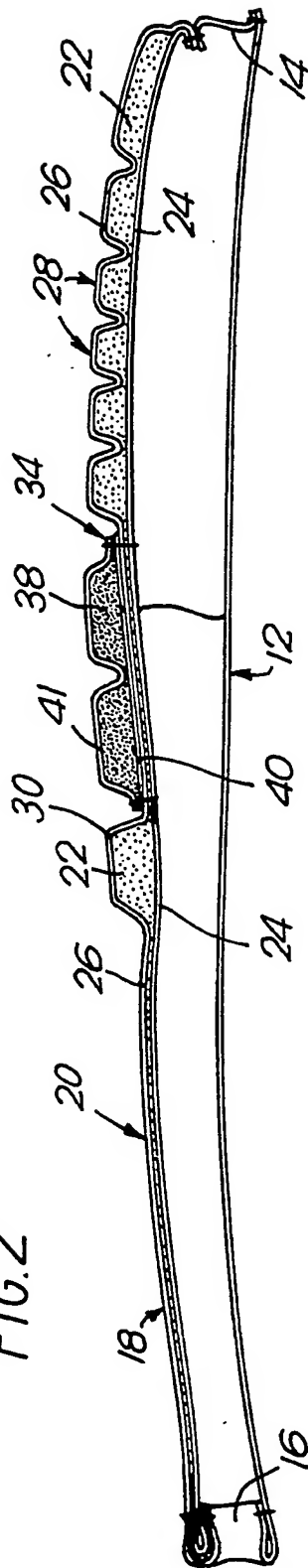


FIG. 2



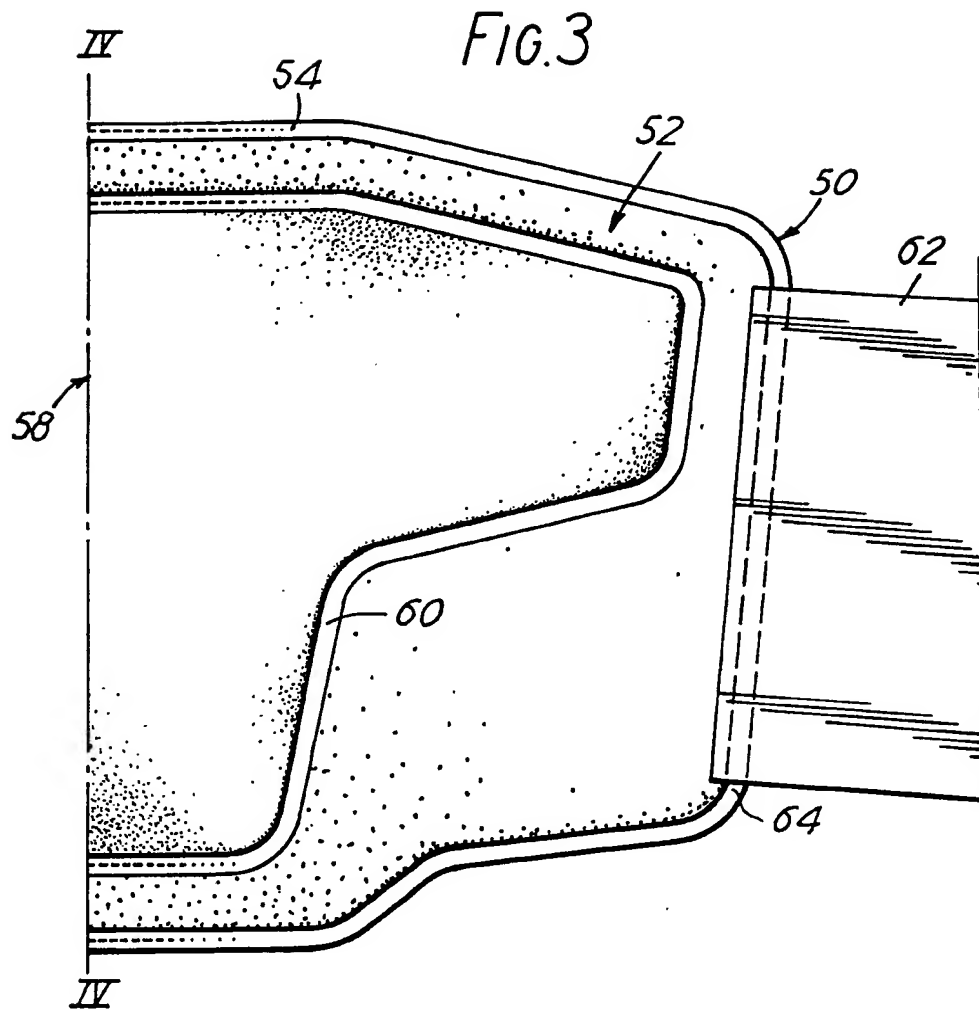
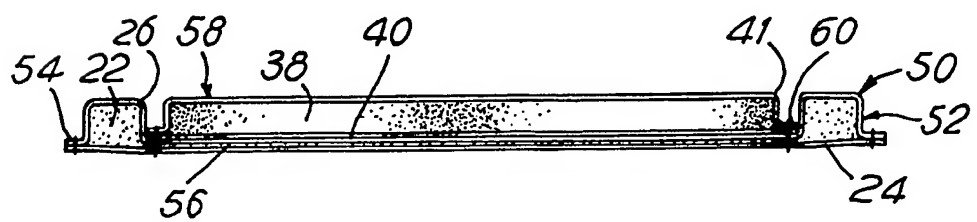


FIG. 4



IMPROVEMENTS IN AND RELATING TO
PROTECTIVE GARMENTS

This invention relates to padding for incorporation into garments which are particularly, but not exclusively, useful for protecting the regions vulnerable to injury by impact or abrasion of a person competing in sport and other activities where protection for such regions of the body, as for example the back of the hand (including the fingers and/or thumb) or the kidneys, is required.

It is known from US Patent Specification No 4,484,359 (Tirinen) to provide a glove having a padded back comprising a single piece of resilient cellular material which is compression moulded so as to leave protrusions above the finger, knuckle, metacarpal and wrist portions of the hand. Such protrusions provide substantially uniform energy-absorption over the whole area of the back of the hand, but do not in fact provide sufficient protection for the vulnerable knuckle area.

An attempt has been made to provide differential protection by mounting injection-moulded hollow plastic parts over the knuckle and finger area of the glove. However, such a

construction is expensive, difficult to manufacture and results in a glove which is clumsy and uncomfortable to wear.

It is also known to provide a belt for protecting the lower back and the kidneys of a person engaged in an activity where the kidneys are vulnerable to impact.

An aim of the present invention is to provide a garment which provides greater protection against impact in a more vulnerable region than in an adjacent, less vulnerable region without significant loss in flexibility.

According to the present invention there is provided a padding construction for a protective garment, the padding being formed of mouldable resilient material and having greater energy absorption in one area than in another. For example, in the case of the padded back (which term is used herein optionally to include the thumb) of a protective glove the padding may have greater energy absorption in the knuckle area than over at least the distal portions of the fingers, and preferably also over the back of the hand. In the case of a kidney belt the padding may have greater energy absorption over a central area than in a surrounding

area. It will be appreciated that these constructions confer greater flexibility and therefore comfort in wear.

Typically, the padding is constituted by a mouldable resilient foam material, the foam in, for example, the knuckle region of a glove being harder than that over the bottom part of the backs of the fingers; desirably the foam over the knuckles is also thicker.

Preferably, the foam material is a closed-cell foam, which has better energy absorbing properties and is more easily mouldable than an open-cell foam. A polyethylene closed-cell foam is most preferable. An example of another suitable material which is currently available is Alveolite (Trade Mark).

Conveniently, the padding is formed from a layer of foam laminated on one face to a material suitable for forming the outer layer of the garment and on the other face to a material suitable for a lining layer. In a glove according to the invention the laminated foam may be locally compressed under heat to form thin areas over the joints which act as hinges connecting two neighbouring uncompressed areas which constitute protruding pads over the

areas of the hand between joints.

Although the invention may be carried out in a variety of ways, two particular embodiments thereof will now be described, by way of example, with reference to the accompanying drawings in which:

Figure 1 is a top plan view of the back of a glove in accordance with the invention;

Figure 2 is a longitudinal cross-sectional view taken along the line II - II in Figure 1;

Figure 3 is an elevation of a portion of a lower back support/kidney belt; and

Figure 4 is a section on the line IV-IV of Figure 3.

In Figures 1 and 2 of the drawings, a protective glove for use in motocross is generally indicated as 10 and has a front or palm portion 12, finger gussets 14, and side gussets 16, a thumb (not shown) and an elasticated wrist fastening (also not shown) which, as they are of conventional construction and not relevant to the invention, will not be described in detail.

The back 18 of the glove 10 is formed from a single sheet 20 of laminated material comprising a layer of foam 22 having a density of 30 Kg/m^3 and

faced on its inside with a fleecy velour layer 24 and on its outside with a smooth, stretchy material 26 of the type known as 'Lycra'. The sheet 20 is locally compressed under heat and pressure to collapse the foam 22 and leave a series of isolated upstanding protrusions which may be classified as digital pads 28 for protecting the backs of the fingers; a metacarpal pad 30; and a wrist pad 32. Over the knuckle region the 'Lycra' layer 26 and some of the foam layer 22 is compressed to accommodate an overlying panel 34 of foam material similar to that of the sheet 20 but differing in having a layer of foam 38 of a density of 70 Kg/m^3 , ie harder than the foam 22 and in having the base layer 40 formed of a less fleecy material than the material 24. On its outer surface the foam layer is faced with a 'Lycra' layer 41 or a layer of 'Kevlar' or similar fabric (preferably elasticated) for activities where greater protection is required.

The panel 34 is similarly compression-moulded to leave two knuckle pads 39; six proximal digital pads 42; and two outer metacarpal pads 44.

If desired the compressed area of the sheet 20 over the back of the hand may have for ventilation purposes apertures across which are

secured panels of highly porous material, for example an open-cell foam faced on each side with an appropriate knitted material.

In an alternative construction the back 18 of the glove may be formed of a single sheet of basic material which is apertured to allow the projection therethrough of the various pads, 28, 38 etc, the margins of the apertures being stitched to the compressed area of the laminated foam sheet.

By using foams having different energy absorbing and protective characteristics the glove 10 provides the greatest protection where it is most needed, ie over the knuckles, without making the glove uncomfortable to wear or inhibiting the wearer's manual movements. Moreover, the employment of two different foam sheets allows the outer fabric layer on each to be chosen to provide interesting colour effects without resorting to screen-printing, transfer printing or previously printing the outer layer.

As shown in Figures 3 and 4 a kidney belt 50 comprises a panel 52 of the softer fabric-faced foam 22 described above which is locally compressed and stitched around its perimeter 54 to form a durable edge and over a central area 56 generally

the shape of a thick letter T. Over the area 56 is superimposed a panel 58 of the harder fabric-faced foam 38 described above, the panel 58 being secured by stitching around its compressed margin 60. An elasticated belt 62 is stitched to the side edges 64 of the panel 52.

It will be appreciated that the kidney belt 50 provides, in comparison with a conventional belt, enhanced protection for the most vulnerable areas at the same time as being more flexible and thus affording greater comfort in wear.

In an alternative version of the belt 50 the area of the pad 52 underlying the panel 58 may be cut away, the panel 58 being secured in the aperture so formed.

CLAIMS

1. Padding for incorporation into a garment to protect the wearer against injury by impact and abrasion, the padding being formed of mouldable resilient material, the material having greater energy absorption in a first area protecting a more vulnerable region of the wearer than in a second area protecting a less vulnerable region of the wearer.

2. Padding as claimed in claim 1, in which the material is harder in said first area than in said second area.

3. Padding as claimed in claim 1 or 2, in which the material is thicker in said first area than in said second area.

4. Padding as claimed in claim 1, 2 or 3 in which the material is faced on one or both sides with a layer of fabric.

5. Padding as claimed in any preceding claim, in which said material is a mouldable resilient foam material.

6. Padding as claimed in claim 5, in which said foam material is a closed-cell foam material.

7. Padding as claimed in claim 5 or 6, in which said foam material is a polyethylene foam

material.

8. Padding as claimed in claim 5, 6 or 7 and comprising a layer of said foam material having lesser energy absorption extending over said first and second areas, said layer being locally compressed in said first area to accommodate a superimposed layer of said foam material having greater energy absorption.

9. Padding as claimed in any one of claims 5 to 8, in which a layer of said foam material in said first or second area is locally compressed to form a hinge between the adjacent portions of foam material thus separated.

10. A protective belt incorporating padding as claimed in any one of claims 1 to 9.

11. A protective glove incorporating padding as claimed in any one of claims 1 to 9.

12. Padding as claimed in claim 1 and substantially as herein described.

13. An article of clothing substantially as herein described with reference to Figures 1 and 2 or Figures 3 and 4 of the accompanying drawings.

14. The features herein described, or their equivalents, in any novel, patentable selection.